WHAT IS CLAIMED IS:

1. A semiconductor device comprising a semiconductor substrate and a metal-compound film thereon, wherein the metal-compound film has a composition represented by the formula:

$MO_xC_yN_z$

wherein x, y and z meet the conditions: $0<x$, $0.1\leq y\leq 1.25$, $0.01\leq z$ and $x+y+z=2$; and M comprises at least Hf or Zr.

2. The semiconductor device as claimed in Claim 1, wherein the formula further meets the conditions: $0.7\leq x\leq 1.85$ and $0.05\leq z\leq 0.2$.

3. The semiconductor device as claimed in Claim 1, wherein the metal-compound film is formed by chemical vapor deposition.

4. The semiconductor device as claimed in Claim 1, wherein the metal-compound film is formed by atomic layer deposition.

5. A semiconductor device comprising a semiconductor substrate, a pair of electrodes thereon and a capacitor comprising a dielectric film between the electrodes, wherein the dielectric film comprises a metal-compound film having a composition represented by the formula:

$MO_xC_yN_z$

wherein x, y and z meet the conditions: $0<x$, $0.1\leq y\leq 1.25$, $0.01\leq z$ and $x+y+z=2$; and M comprises at least Hf or Zr.

6. The semiconductor device as claimed in Claim 5, wherein said pair of electrodes comprise one or more of metal-compound selected from the group consisting of TiN, Ti, TaN, Ta, W, WN, Pt, Ir and Ru.

7. The semiconductor device as claimed in Claim 5, wherein said pair of electrodes comprise TiN.

8. The semiconductor device as claimed in Claim 5, wherein

the thickness of said pair of electrodes is 5 to 40 nm.

9. The semiconductor device as claimed in Claim 5, further comprising a gate electrode formed on the semiconductor substrate; a transistor comprising:

a source and a drain regions formed in the semiconductor substrate whose surfaces are silicided; and

a connecting plug for connecting the source and the drain regions in the transistor with the capacitor.

10. A semiconductor device comprising a semiconductor substrate; a gate insulating film formed on the main surface of the semiconductor substrate; a gate electrode on the gate insulating film; and a source and a drain regions formed on the semiconductor substrate which together sandwich the gate electrode,

wherein the gate insulating film comprises a metal-compound film having a composition represented by the formula:

$MO_xC_yN_z$

wherein x, y and z meet the conditions: $0<x$, $0.1\leq y\leq 1.25$, $0.01\leq z$ and $x+y+z=2$; and M comprises at least Hf or Zr.

11. A process for manufacturing a semiconductor device, comprising the step of forming a metal-compound film having a composition represented by the formula:

$MO_xC_yN_z$

wherein x, y and z meet the conditions: $0<x$, $0.1\leq y\leq 1.25$, $0.01\leq z$ and $x+y+z=2$; and M comprises at least Hf or Zr, on a semiconductor substrate by atomic layer deposition.

12. The process for manufacturing a semiconductor device as claimed in Claim 11, wherein the formula meets the conditions:

$0.7 \leq x \leq 1.85$ and $0.05 \leq z \leq 0.2$.

13. The process for manufacturing a semiconductor device as claimed in Claim 11, wherein when forming the metal-compound film by atomic layer deposition, $M(NRR')_4$ wherein M comprises at least Hf or Zr; and R and R' independently represent hydrocarbon, is used as a component of a deposition gas.

14. The process for manufacturing a semiconductor device as claimed in Claim11, wherein when forming the metal-compound film by atomic layer deposition, one or more of gases selected from the group consisting of NO, N_2O, NO_2, H_2O, O_2 and O_3 are used as an oxidizer gas.

15. The process for manufacturing a semiconductor device as claimed in Claim 11, comprising the step of annealing the metal-compound film under nitrogen or a nitrogen-containing atmosphere after forming the metal-compound film, to introduce nitrogen into the metal-compound film.

16. The process for manufacturing a semiconductor device as claimed in Claim 15, wherein the step of introducing nitrogen into the metal-compound film is conducted using a remote plasma.

17. A process for manufacturing a semiconductor device comprising forming a first electrode, a dielectric film and a second electrode on a semiconductor substrate,

wherein the step of forming the dielectric film comprises forming a metal-compound film having a composition represented by the formula:

$MO_xC_yN_z$

wherein x, y and z meet the conditions: $0<x$, $0.1 \leq y \leq 1.25$, $0.01 \leq z$ and $x+y+z=2$; and M comprises at least Hf or Zr, on a semiconductor

substrate by atomic layer deposition.

18. The process for manufacturing a semiconductor device as claimed in Claim 17, further comprising the steps of:

forming a gate electrode on the semiconductor substrate;

introducing a dopant into the main surface of the semiconductor substrate to form a source and a drain regions such that the gate electrode is sandwiched between the regions;

siliciding the surfaces of the source and the drain regions; and

forming an interlayer insulating film over the gate electrode, the source region and the drain region, then selectively removing the interlayer insulating film to form a contact hole reaching the source and the drain regions, and then filling the contact hole with a metal film to form a connecting plug,

wherein the first electrode is formed such that the connecting plug is connected with the first electrode;

the dielectric film is formed at 200 °C to 400 °C both inclusive and the first and the second electrodes are formed at 500 °C or lower.

19. The process for manufacturing a semiconductor device as claimed in Claim 17, wherein the step of forming the first electrode comprises forming the first electrode by ALD, CVD or sputtering at 500 °C or lower, and the step of forming the second electrode comprises forming the second electrode by ALD, CVD or sputtering at 500 °C or lower.

20. A process for manufacturing a semiconductor device comprising the steps of:

forming a gate insulating film on a semiconductor substrate;

forming a gate electrode film on the gate insulating film;

shaping the gate insulating film and the gate electrode film into a given shape to form a gate electrode; and

introducing a dopant into the main surface of the semiconductor substrate to form a source and a drain regions such that the gate electrode is sandwiched between the regions,

wherein the step of forming the gate insulating film comprises forming a metal-compound film having a composition represented by the formula:

$MO_xC_yN_z$

wherein x, y and z meet the conditions: $0<x$, $0.1\leq y\leq 1.25$, $0.01\leq z$ and $x+y+z=2$; and M comprises at least Hf or Zr, on a semiconductor substrate by atomic layer deposition.